

REMARKS

Claims 11, 13-14 and 16 are amended, claims 22-30 are added, and claim 12 is cancelled by this amendment. Upon entry, claims 11 and 13-30 will be pending in this application.

The following remarks are responsive to the Office action dated September 22, 2004.

RESPONSE TO REJECTION UNDER 35 USC § 112

Claim 11 is rejected under § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that applicant regards as the invention.

Applicant respectfully traverses the rejection. The phrase "lying one on the other" in the statement "individual windings of conduit lying one on the other and contacting each other" is clear. As shown in Figs. 1a-1b, as well as the other figures, the windings of conduit are wound in a spiral, meaning that the outer wall of an inner winding contacts the inner wall of an outer winding. When the windings shown in Fig. 1A are viewed from the side, one will see that the windings are lying one on the other. Thus, the recitation is clear and correctly describes the embodiments shown in the Figures. Applicant respectfully requests the rejection be withdrawn.

General Considerations

An embodiment of the claimed device is intended for purifying water (e.g., for drinking water) in underdeveloped countries or in regions where clean drinking water is not available. The handling of the device should be very simple so that it can be operated without sophisticated technical training. One embodiment of the device requires only a small amount of power, so that it can be operated by solar power, rather than electric or mechanical power. Another embodiment uses a small gas burner, e.g., a camping burner, as a heating source. The

device is desirably very compact, in one embodiment having a diameter of about 20 cm (without a power supply). One needs only to supply a reservoir of water to be purified, a tube for connecting the reservoir to the device, and a second reservoir for collecting the purified water. The device also operates relatively quickly for such a small device. One embodiment of the invention can produce about ten liters of pure drinking water in about eight hours.

Response to Rejections

Claim 11 recites a device for thermal sterilization of liquids comprising:

a counterflow heat exchanger including a conduit with a heating section and a cooling section in fluid connection with one another,

a heating source for heating the liquid,

the heating section and the cooling section being spirally arranged around the heating source,

the heating source being generally located in the center of the spiral,

said conduit being constructed of flexible material,

individual windings of conduit lying one on the other and contacting each other, and

a check valve for allowing liquid flow only in a direction from the heating section to the cooling section.

Claim 11 stands rejected as anticipated by US 6,623,603 (Call). Original dependent claim 12 (claiming a check valve now incorporated into claim 11) was rejected as obvious in view of Call and Cisar (U.S. Pat. No. 6,555,055). Applicant traverses the rejection of both claims because the cited references fail to show or suggest the claimed combination, including the combination of the following elements:

1. the spiral arrangement of the heating and cooling sections

2. conduit being constructed of flexible material, and
3. a check valve.

Call discloses an apparatus for purifying water comprising a counterflow heat exchanger having a preheater (e.g., 100 in Fig. 6) and a condenser 104 in fluid connection. As shown more clearly in the embodiments of Figs. 11 and 14, a heating source (200, 300) may be arranged in the center of the preheater and condenser.

Call states (at column 9, line 65) that the fed water can be pressurized to cause it to flow into the preheater by using gravity feed, using a pump, or by employing a pressurized tank as a storage device. Its unclear from Call whether the mentioned pump is establishing a fluid flow only in one direction; this may depend on the construction of the pump. There is also a question as to the relative liquid pressure produced by the pump versus the liquid counterpressure produced by the heating device.

In an embodiment of the present invention, the liquid (water) is heated to very high temperatures up to 150°C by the heating device. The high temperatures will cause superheated steam to be produced in the center of the spiral arrangement, thereby dramatically increasing the pressure. When the high pressure is greater than the water pressure from the supply, the high pressure will act as a pump to cause a backflow. Therefore, the claimed device needs an additional element for preventing a backflow against the supply. As amended, claim 11 requires a check valve for preventing this backflow.

In addition, the gas pressure of the superheated steam is not constant but is varying within a large range. Because of this variance, pressure waves are produced. If one uses only a pump as taught by Call, these pressure waves can reach the outlet of the pump, and can even destroy the pump. The check valve of

the present invention blocks the pressure waves and inhibits them from reaching the outlet.

Cisar discloses a pasteurizer coupled with a disinfectant unit in flow communication with a fluid source for use in disinfecting dental or other water lines. As shown in Fig. 1, the Cisar system includes a check valve. However, there is no suggestion or motivation for combination of Cisar's check valve with Call's apparatus.

The checkvalve of Cisar is apparently only installed for the purpose of preventing backflow. In contrast, the checkvalve of the invention has the further purposes of:

- 1) blocking pressure waves of gas bubbles of superheated steam from escaping through the inlet of the device, and
- 2) in combination with the flexible conduit, aiding the below-mentioned "peristaltic motion", which drives the water flow in the desired direction.

Again, neither Call nor Cisar suggest addition of a check valve to the device of Call. Moreover, neither suggests such an addition for these two purposes, which provide an advantage in combination with the other claimed elements of the invention.

The motivation for use of check valves in Cisar is completely unrelated to that of the claimed invention. Col. 3, lines 14-25 of Cisar states as follows:

The current recommendations from the CDC for reducing the risk of contamination from dental unit water lines (DUWLs) involve a series of steps that must be followed conscientiously if they are to succeed. The first of these is the installation and use of anti-retraction valves (check valves to limit flow in a line to one direction) on all water and air lines. These devices prevent saliva and other fluids from the patient from being sucked back into water lines and colonizing the biofilm present in the water line. This is a concern because saliva from a patient's mouth is

more likely to contain pathogenic organisms than the incoming water from a municipal water system.

As can be seen, Cisar teaches a check valve for use in dental water lines, not for the device of the present invention. It can also be seen from a review of Cisar that the system disclosed therein is complicated and includes many components not needed in applicant's invention. The Examiner provides no reason why one of ordinary skill in the art would be motivated to select this one element (the check valve, which is admittedly old in the art) from Cisar's complicated system.

Regarding combining elements found in the prior art, the Federal Circuit has stated: "Most if not all inventions arise from a combination of old elements. See *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998). Thus, every element of a claimed invention may often be found in the prior art. See *id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. See *id.* Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant." *In re Kotzab*, 217 F. 3d. 1365, 1369-1370 (Fed. Cir. 2000). *Emphasis added.* "Further, a rejection cannot be predicated on the mere identification...of individual components of claimed limitations. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *Id.* at 1371. *Emphasis added.*

In view of the above, claim 11 is patentable over Call, Cisar and the other prior art of record.

Claim 11 is further patentable over Call because it recites that the conduit is constructed of flexible material. Call does

not show or suggest a conduit constructed of flexible material, nor does Call show or suggest elastic films as asserted in the rejection. In column 7, line 59 through column 8, line 9, Call describes a heat exchange plate 38, a cover plate 48 and dividers. Contrary to the rejection, Call does not state that these plates and dividers are elastic films. Rather, the plates and dividers of Call appear to be, and consistent with the term "plate", relatively rigid elements. In contrast, the claimed conduit is constructed of flexible material (see final paragraph of page 4 of the application). The material is flexible for distributing an overpressure over the entire heat exchanger. By this flexibility, a "peristaltic motion" arises, which promotes additional transport of the water, in combination with the checkvalve at the inlet, producing a pulsing water flow through the heat exchanger with phases of higher and lower flow velocity. Because of this "pump effect" of the conduit, the device operates even with very minimal water pressure at the heat exchanger inlet (comp. page 5, first paragraph of the English translation of the invention).

Claim 11 also patentably distinguishes over Call because of the claimed spiral arrangement of the heating section and the cooling section. Call does not show or suggest a spiral arrangement. Note the definition of spiral is "winding around a center or pole and gradually receding from or approaching it."¹ The preheater and condenser of Call are arranged in concentric circles, as shown for example, in Figures 11 and 14. Call does not show a winding around a center or pole. Moreover, the water in Call flows in an axial direction through a first channel (e.g., 378, 376), then changes direction at the top or bottom to flow in an opposite axial direction. In contrast to Call, the claimed spiral arrangement provides for a curved path where the

¹Merriam-Webster's Collegiate Dictionary, 1133 (Tenth Edition 1996)

curve radius is increasing/decreasing continuously in the flow direction.

As can be seen, this synergistic combination of features of claim 11, including the flexible conduit, the spiral arrangement and the check valve, work together in a new device that is a significant improvement over the prior art. The claimed device is desirably compact, easy to operate, and operates with relatively little power. This synergistic combination of features is clearly not shown or suggested by Call, Cisar or the other art of record. Accordingly, claim 11 is allowable.

Claims 13-21 depend directly or indirectly from claim 11 and are submitted as patentable for the same reasons.

Claims 15-16 recite that the conduit comprises elastic films. The rejection states that elements 36 and 48 of Call are elastic films. However, Call states that elements 36 and 48 are dividers and a cover plate, respectively. Because Call does not disclose elastic films, claims 15-16 are submitted as patentable for this additional reason.

Claims 18-19 are directed to aspects of the claimed windings. Call does not disclose windings, and therefore claims 18-19 are patentable for this additional reason.

Claim 20 states that the conduit is made of a metal film. Call does not disclose or suggest a conduit made of a film. Thus, claim 20 is submitted as patentable for this additional reason.

Claim 21 adds that the conduit is made of a plastic film. Claim 21 is rejected as obvious in view of Call and Lowenstein (US Pat. No. 5,638,900). Lowenstein discloses a heat exchange assembly including at least one plate having a plurality of channels therein for the flow of the heat exchange fluid. Lowenstein discloses the assembly may be made of plastic, but does not disclose a plastic film, as claimed. Also, there is no suggestion or motivation to combine Lowenstein and Call in the

manner suggested in the rejection. Accordingly, the rejection of claim 21 should be withdrawn for these additional reasons.

New claims 22-30 are also submitted as patentable. To the extent these claims include the same elements as the above-discussed claims, they are submitted as patentable for the same reasons.

CONCLUSION

In view of the foregoing, allowance of the application is respectfully required. The undersigned requests a telephone interview with the Examiner if the application is not allowed following review of this paper.

Applicant does not believe that a fee is due in connection with this response. If, however, the Commissioner determines that a fee is due, he is authorized to charge Deposit Account No. 19-1345.

Respectfully submitted,



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